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ANNUAL REPORT 1965

BRANTFORD

water pollution control plant

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Ontario Water Resources Commission

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Brantford : water pollution
control plant.

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ONTARIO WATER RESOURCES COMMISSION

OFFICE OF THE GENERAL MANAGER

Members of the Brantford Local Advisory Committee,
City of Brantford.

Gentlemen:

I am pleased to provide you with the 1965 Annual Report for the Brantford Water Pollution Control Plant, OWRC Project No. 58-S-11.

We appreciate the co-operation you have extended to our Operations staff throughout the year, and trust that continuation of this close association will ensure even greater progress in the sphere of water pollution control.

Yours very truly,

D. S. Caverly,
General Manager.

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ONTARIO WATER RESOURCES COMMISSION
801 BAY STREET
TORONTO 5

J. A. VANCE, LL.D.
CHAIRMAN

J. H. H. ROOT, M.P.P.
VICE-CHAIRMAN

D. S. CAVERLY
GENERAL MANAGER

W. S. MacDONNELL
COMMISSION SECRETARY

General Manager,
Ontario Water Resources Commission.

Dear Sir:

I am pleased to provide you with the 1965 Annual Report on the operation of the Brantford Water Pollution Control Plant, OWRC Project No. 58-S-11.

The report presents design data, outlines operating problems encountered during the year and summarizes in graphs, charts and tables all significant flow and cost data.

Yours very truly,

B. C. Palmer, P. Eng.,
Director,
Division of Plant Operations.

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FOREWORD

This report provides useful information on the operating efficiency of this project during 1965. It is intended to act as a guide in gauging plant performance. To implement that aim, it includes detailed statistical and cost data, a description of the project and a summary of its operation during the year.

Of particular interest will be the cost data, which show the total cost to the municipality and the areas of major expenditure.

The Regional Operations Engineer is primarily responsible for the preparation of the report, and has compiled and arranged the material. He will be pleased to answer any questions regarding it. Other groups, however, were involved in the production, and these include the statistics section, the Drafting Section of the Division of Sanitary Engineering and the Division of Finance.

B. C. Palmer, P. Eng.,
Director,
Division of Plant Operations.

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BRANTFORD

water pollution control plant

operated for

THE CITY OF BRANTFORD

by

THE ONTARIO WATER RESOURCES COMMISSION

CHAIRMAN: Dr. James A. Vance

VICE-CHAIRMAN: J. H. H. Root, M.P.P.

COMMISSIONERS

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D. A. Moodie — L. E. Venchiarutti

GENERAL MANAGER: D. S. Caverly

ASSISTANT GENERAL MANAGERS

L. E. Owers — K. H. Sharpe
F. A. Voege — A. K. Watt

COMMISSION SECRETARY

W. S. MacDonnell

DIVISION OF PLANT OPERATIONS

DIRECTOR: B. C. Palmer

Assistant Director: C. W. Perry
Regional Supervisor: A. C. Beattie
Operations Engineer: P. J. Osmond

801 Bay Street Toronto 5

'65 REVIEW

Operating costs for the Brantford WPCP in 1965 were $185,704.83. This is approximately $13,800 or 8% higher than in 1964. The increase is due to the inevitable increase in the cost of goods and services and labour and a temporary imbalance in stocking of materials, particularly chemicals. This imbalance tends to even out over a lengthened period of time.

The average daily flow of 6.57 million gallons is 8% higher than in 1964, however, it represents only 52.5% of the plant design capacity. Further increases are expected in the future.

The raw sewage influent to the plant was slightly weaker in 1965 than in 1964, whereas the quality of the effluent from the plant was much improved. OWRC effluent objectives were met 55% and 40% of the time for BOD and SS respectively. Sludge quantities throughout the entire system were decreased again in 1965 due to more efficient concentrating and supernating practices.

OWRC head office technicians spent over 30 manhours at the plant inspecting and reporting on the mechanical and electrical maintenance being carried out by the plant staff. It was found that maintenance was generally satisfactory.

Improvements implemented during the year include: more efficient collection and removal of lime dust from the filter building and decreased use of potable city water through installation of a new process water pump. Tours by local organizations, casual visitors, etc., continued in 1965, and helped through personal contact, to maintain good public relations.

GLOSSARY

BOD	biochemical oxygen demand (a measure of organic content)
cfm	cubic feet per minute
comminution	shredding of solids into small fragments
DWF	dry weather flow
effluent	outflow
flocculation	bringing very small particles together to form a larger mass (the floc) before settling
fps	feet per second
gpcd	gallons per capita per day
gpm	gallons per minute
grit	sand, dust, stones, cinders and other heavy inorganic material
influent	inflow
lin. ft.	lineal feet
mgd	million gallons per day
mlss	mixed liquor suspended solids
ppm	parts per million
ss	suspended solids
TDH	total dynamic head (usually refers to pressure on a pump when it is in operation)

HISTORY
1956 - 1965

INCEPTION

In 1956, the City of Brantford and the Ontario Water Resources Commission initiated plans for the construction of a modern water pollution control plant.

The firm of Proctor and Redfern - Toronto, Ontario, Consulting Engineers, was engaged to prepare plans and specifications for the project.

APPROVAL

Late in 1956, the city signed an agreement with the Ontario Water Resources Commission to finance, construct and operate the plant.

CONSTRUCTION

Dunker Construction Limited - Kitchener, Ontario began construction in 1958, and by January of 1960, the Division of Plant Operations took over the operation.

TOTAL COST

$2,250,950.02



Project Staff

Mr. George Bragg
Superintendent

Assistant Superintendent - J. Harcourt

Shift Foremen	Maintenance Foreman	Operators
A. Alonzo	J. Wilkinson	D. Calder
E. Hosner		T. Davis
W. Mabbot	Maintenance Operators	G. Ott
E. Micks		C. Parsons
L. Miller	G. McLauchlin	B. Reansbury
	R. Punter	
	F. Robus	

Laboratory Technician	Filter Operator	Groundskeepers
		H. Bradshaw
T. Alkema	S. Nettleton	F. Grummett

COMMENTS

Late in 1965 and very early in 1966 the Brantford staff was reorganized to provide a more efficient use of manpower and consequently a more efficient operation of the plant. This reorganization is being included in the 1965 report as it was initiated in 1965 and completed very early in 1966. The main features of the reorganization are an increase in maintenance staff and groundskeeping staff, a decrease in actual process staff and the reduction of the total staff complement from twenty-two men to twenty. This reduction was accomplished without lay offs since there were three resignations during the year. The following promotions or transfers occurred:

J. Harcourt from Shift Foreman to Assistant Superintendent.
A. Alonzo from Operator to Shift Foreman.
E. Micks from Filter Operator to Shift Foreman.
R. Punter from Operator to Maintenance Operator.
H. Bradshaw from Operator to Groundskeeper.
S. Nettleton from Clerk to Filter Operator.

Mr. T. Davis was hired to fill a vacant operators position. Resignations were received from Mr. C. Burnside, Mr. D. Milne, Mr. C. Parsons and Mr. A. Stafford. Mr. Burnside left to accept the position of superintendent of the new St. Catharines WPCP and was given every wish for success. Mr. Parsons was later rehired. Casual labour was used from May through September.

During the year Messrs. Mabbot, Miller and McLauchlin completed the Basic and Intermediate portion of a course for Sewage Works Operators. Messrs. Bragg, Wilkinson and Harcourt attended a 3 day course which led to certification as a Maintenance Gas Fitter. All were successful. Mr. Bragg also attended a chief operators' conference in April 1965.



Description of Project

INFLUENT WORKS

The sewage enters the plant through a 48 inch diameter sewer and passes through a Parshall flume where the flow is metered. From the Parshall flume it divides and passes through two rotogrators. The rotogrators employ bar screens to trap the larger solids and cutting knives to macerate these solids. A bypass channel is provided to facilitate any repairs to the rotogrators. Flow from the rotogrators is directed to two wet wells where it is pumped by four raw sewage pumps, each having a capacity of 5.5 million gallons per day, to two detritors located on the roof of the garage.

The detritors are square shallow tanks which allow sand and grit to settle. The washed grit is collected and removed from the detritor mechanically and stored in a large hopper. The grit is removed from the storage hopper and disposed of on the adjacent city sanitary land fill project.

PRIMARY CLARIFIERS

Four circular clarifiers, 70 feet in diameter, receive sewage from the grit removal units. Sewage is retained in the clarifiers for 2 hours at design flow. Approximately 50 percent of the suspended solids in the incoming sewage settles to the bottom of the clarifiers. Each clarifier is equipped with a circular sludge collector and a circular scum skimmer which removes the settled sludge and floating scum, to hoppers located respectively at the bottom and top of the clarifier. The sludge and scum is then pumped to digestion tanks.

AERATION

Settled sewage from the primary clarifiers flows by gravity to two triple-pass aeration tanks. There it is mixed with activated sludge which is returned from the final clarifiers and aerated. Each "pass" of the aeration tanks is 30 feet wide, 15 feet deep and 200 feet long. The total length of each aeration tank is therefore 600 feet.

The aeration section retains the sewage for 6 hours at a flow rate of 12 1/2 million gallons per day. This detention time is decreased by the flow rate of the return sludge.

It is possible to add the primary effluent to the aeration section at various points. This permits the use of modifications to the activated sludge process such as step aeration.

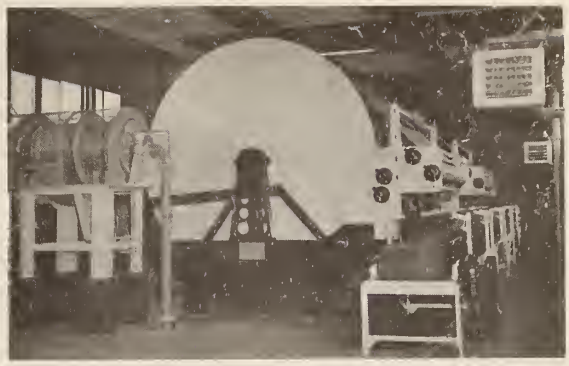
Air is supplied by three blowers each equipped with a 200 hp motor. Each blower is capable of delivering 13,800 cubic feet of air per minute.

FINAL CLARIFIERS

The aerated mixed liquor from the aeration section is retained in four final clarifiers, identical in size to the primary clarifiers. Retention time is two hours at design flow. This allows the activated sludge to settle. It is collected in the bottom of the tanks and returned to the aeration section or wasted. (Excess activated sludge is returned or "wasted" to the primary clarifiers where it settles and is pumped to the digesters). The remaining liquid flows over the weirs of the final clarifiers, is chlorinated in the chlorine contact chamber and flows to the river as plant effluent.



FINAL CLARIFIERS



VACUUM FILTERS

SLUDGE DIGESTION TANKS

The Brantford plant utilizes two stage digestion. There are four digesters; two primary tanks each 55 feet in diameter and two secondary tanks each 70 feet in diameter. The piping between the tanks is so arranged that it is possible to remove sludge from any one of the primary tanks to either of the secondary digesters. It is also possible to remove sludge from the primary digester directly to the vacuum filtration area.

The primary digesters are equipped with fixed steel covers. Two draft tube mixers recirculate the contents of the digester. Each secondary digester is provided with a floating gas holder steel cover. Heat is applied to the contents of the primary digester tanks only.

VACUUM FILTERS

Sludge from the digesters is pumped to either of two vacuum filters. Each filter has a filtering area of 350 square feet and employes coiled stainless steel springs as the filter media. The "drums" are placed under a vacuum and moisture is thus withdrawn from the sludge. Appurtenances included with the filters are vacuum pumps, filtrate receivers, lime and ferric chloride tanks, mixing tanks and sludge pumps.

PROJECT COSTS

NET CAPITAL COST (Final)	$2,250,950.02
DEDUCT - Payments from Municipalities	493,126.02
Long Term Debt to OWRC	$1,757,824.00
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1965	$ 265,147.81
Net Operating	$ 185,704.83
Debt Retirement	46,653.00
Reserve	12,303.45
Interest Charged	98,626.24
TOTAL	$ 343,287.52

RESERVE ACCOUNT

Balance at January 1, 1965	$ 46,892.83
Deposited by Municipality	12,303.45
Interest Earned	2,796.44
	$ 61,992.72
Less Expenditures	(1,489.00)
Balance at December 31, 1965	$ 60,503.72

MONTHLY OPERATING COSTS

MONTH	TOTAL EXPENDITURE	PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICAL	GENERAL SUPPLIES	EQUIPMENT	REPAIRS & MAINTENANCE	*SUNDRY	WATER
JAN	8840.20	8020.48				237.58	238.29	196.88	71.25	75.72	
FEB	12787.19	8020.48		480.96	1947.92	1490.44	149.01		501.39	196.99	
MARCH	16245.82	8839.83			1954.40	811.18	522.88		141.41	3760.04	216.08
APRIL	14415.35	9325.99			2150.53	1998.00	241.96		99.64	599.23	
MAY	17600.14	12162.86	475.20		1969.52	1371.54	344.25	7.36	228.56	723.95	316.90
JUNE	16873.15	8290.47	561.60	522.14	1924.59	2026.42	830.50		2095.30	622.13	
JULY	15123.70	8380.97	457.34	146.49	2028.27	2947.14	128.59		7.20	779.03	248.67
AUG	15691.49	8386.40	720.00		2161.76	2433.35	507.15	607.67	41.69	833.47	
SEPT	13539.80	8464.18	485.28		507.76	906.78	460.20	9.01	497.50	78.00	2131.09
OCT	19918.28	13051.44			2066.72	2294.80	400.38	141.54	717.00	1246.40	
NOV	16547.63	8501.69			3720.29	3910.39	307.47		810.07	635.21	(1337.49)
DEC	18122.08	7320.73			4317.04	2747.41	778.09	723.58	526.87	1359.74	348.62
TOTAL	185704.83	108765.52	2699.42	1149.59	24748.80	23175.03	4908.77	1686.04	5737.88	10909.91	1923.87

* SUNDRY INCLUDES SLUDGE HAULING COSTS WHICH WERE $6007.40
BRACKETS INDICATE CREDIT

YEARLY OPERATING COSTS

YEAR	M.G. TREATED	TOTAL COST	COST PER FAMILY PER YEAR	COST PER MILLION GALLONS	COST PER L.B. OF BOD REMOVED
1961	2287	$155,644.80	*$11.15	$68.00	4 CENTS
1962	2082	$161,031.47	$11.39	$77.00	4 CENTS
1963	2040	$175,173.29	$12.36	$85.87	7 CENTS
1964	2221	$171,859.76	$12.21	$77.39	6 CENTS
1965	2395	$185,704.83	$12.91	$77.53	6 CENTS

* BASED ON ANNUAL POPULATION ESTIMATE AND 3.9 PERSONS PER FAMILY

VACUUM FILTER COSTS (MONTHLY)

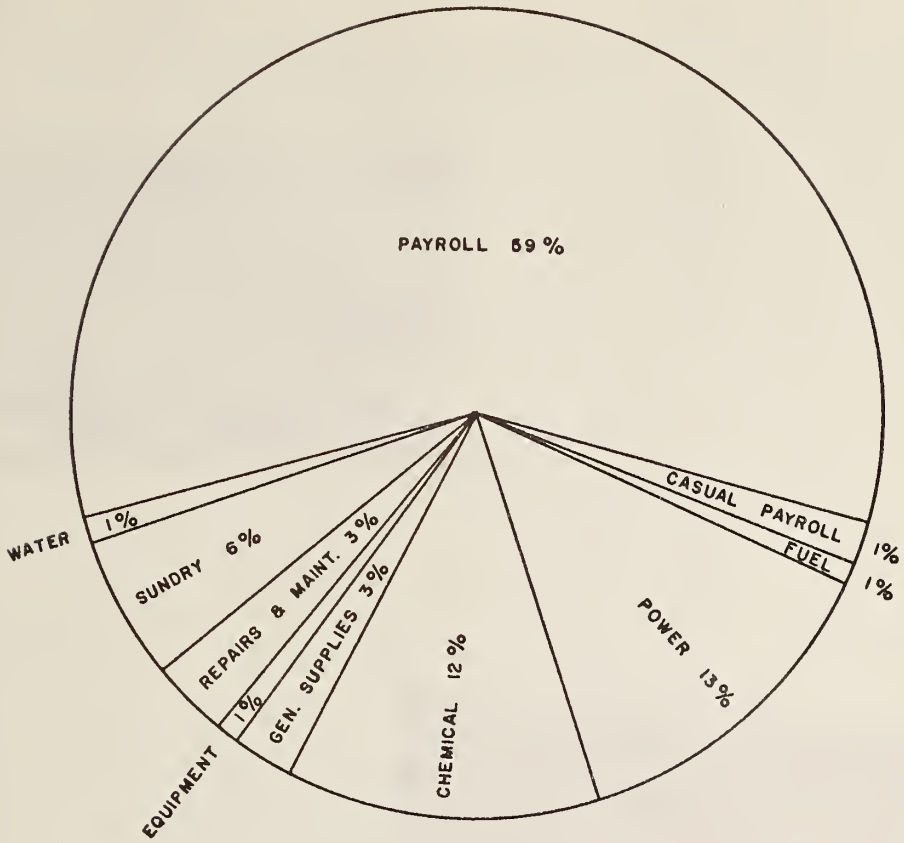
MONTH	COST PER MONTH					TOTAL	COST PER TON DRY WEIGHT					TOTAL
	$FeCl_3$	LIME	LABOUR	ELEC	MAINT		$FeCl_3$	LIME	LABOUR	ELEC	MAINT	
JANUARY	737.79	438.66	425.00	194.63	69.51	1865.59	5.31	3.16	3.06	1.40	0.50	13.43
FEBRUARY	417.36	293.96	425.00	130.76	46.70	1313.78	4.47	3.15	4.55	1.40	0.50	14.07
MARCH	877.94	587.94	425.00	268.04	95.73	2254.65	4.59	3.07	2.22	1.40	0.50	11.78
APRIL	855.10	617.05	425.00	273.69	97.74	2268.58	4.37	3.16	2.17	1.40	0.50	11.60
MAY	717.01	518.49	425.00	262.50	93.75	2016.75	3.82	2.77	2.27	1.40	0.50	10.76
JUNE	790.89	613.72	425.00	308.34	110.12	2248.07	3.59	2.79	1.93	1.40	0.50	10.21
JULY	1051.43	934.29	425.00	446.99	159.64	3017.35	3.29	2.93	1.33	1.40	0.50	9.45
AUGUST	603.20	545.93	425.00	258.68	92.38	1925.19	3.26	2.95	2.30	1.40	0,50	10.41
SEPTEMBER	498.86	520.15	425.00	246.51	88.04	1778.56	2.83	2.95	2.41	1.40	0.50	10.09
OCTOBER	587.01	546.17	425.00	249.23	89.01	1896.42	3.30	3.07	2.39	1.40	0.50	10.66
NOVEMBER	796.45	741.79	425.00	323.53	115.54	2402.31	3.45	3.21	1.84	1.40	0.50	10.40
DECEMBER	731.00	864.44	425.00	354.97	126.78	2502.19	2.88	3.41	1.68	1.40	0.50	9.87
TOTAL	8664.04	7222.59	5100.00	3317.87	1184.94	25489.44	45.16	36.62	28.15	16.80	6.00	132.73
AVERAGE PER MONTH	722.00	601.88	425.00	276.49	98.74	2124.12	3.76	3.05	2.35	1.40	0.50	11.06

COMMENTS

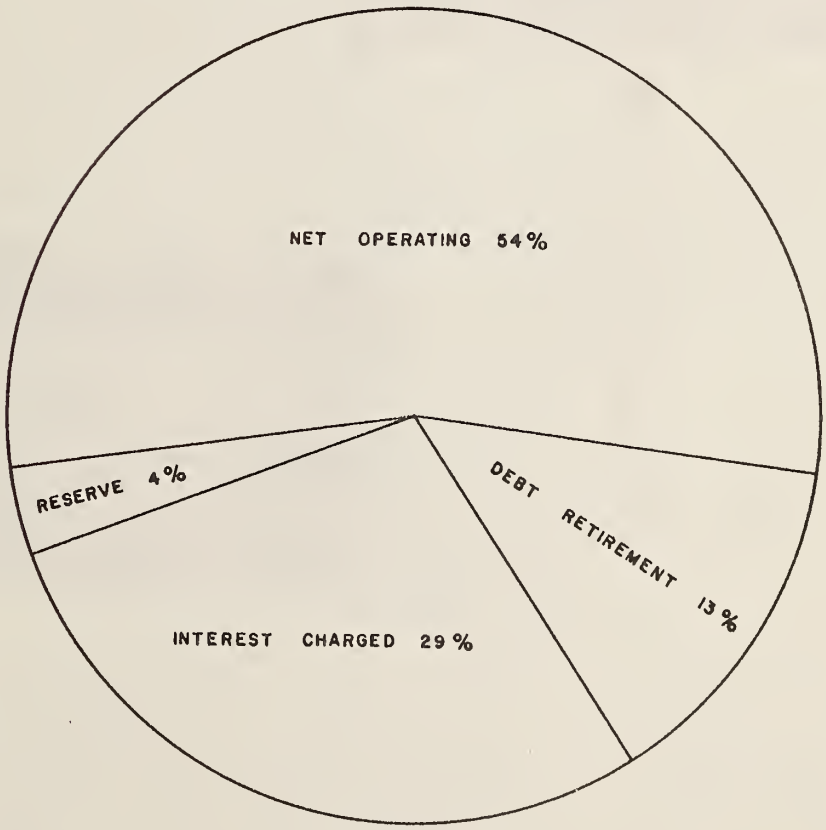
The cost of filtering digested sludge in 1965 was $11.06 per ton of dry solids. This is still below the 1963 cost of $13.97, but is an increase on 1964 costs of $9.94.

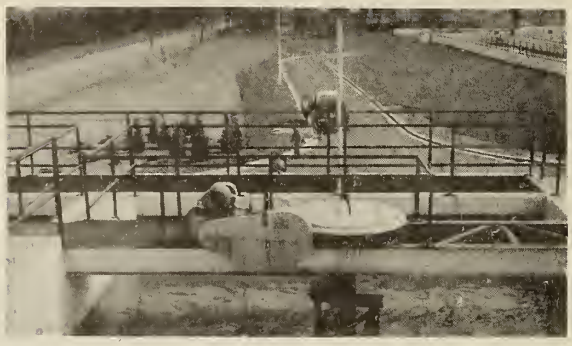
During 1965 filtered sludge was disposed of by hauling it to the city dump located directly behind the plant. A total of 10,991 cubic yards of filtered sludge was hauled during the year at a cost of $.55 per cubic yard.

1965 OPERATING COSTS



TOTAL ANNUAL COST





INFLUENT WORKS

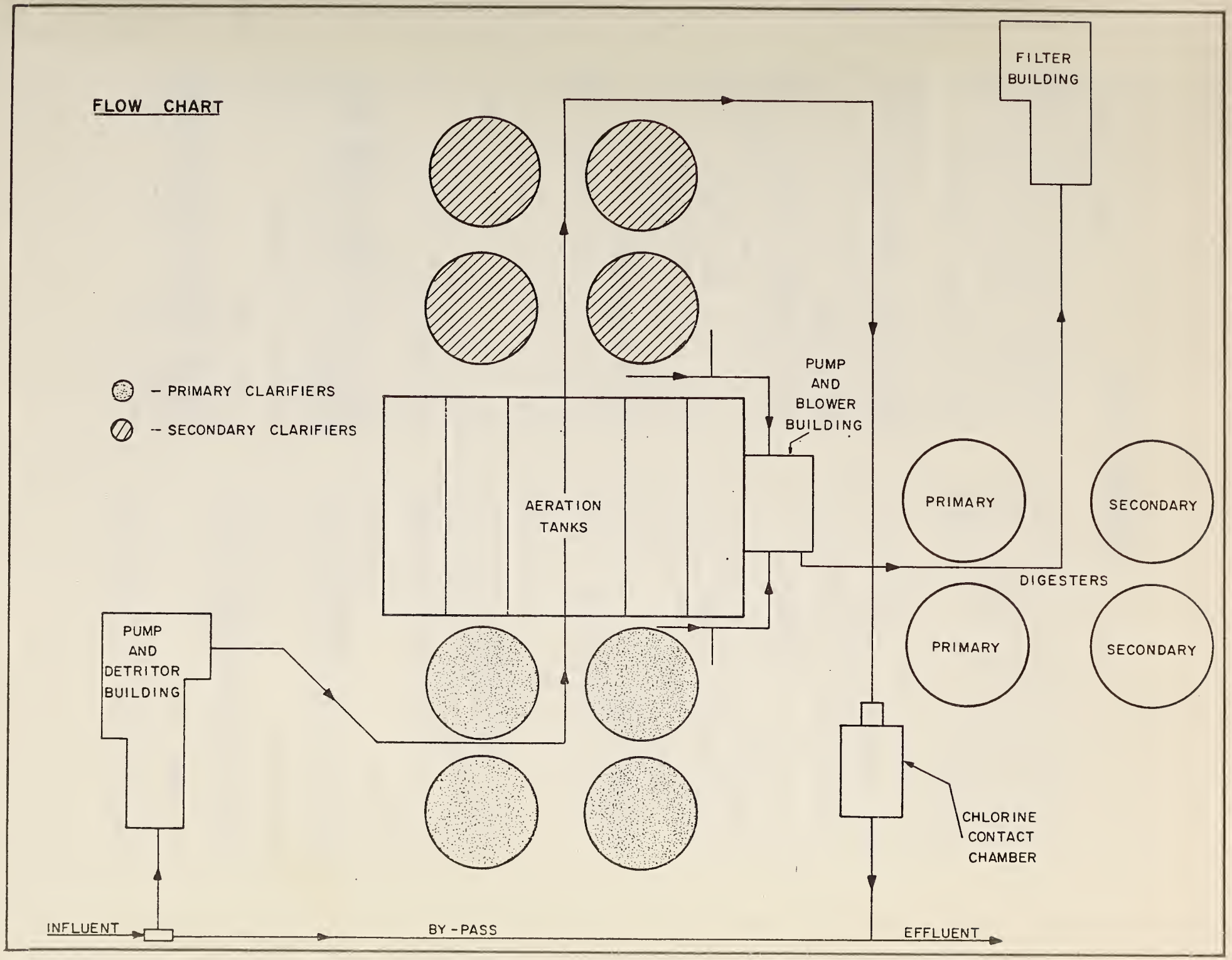


PRIMARY CLARIFIERS



AERATION TANKS

Technical Section


FLOW CHART
FILTER BUILDING
PUMP AND BLOWER BUILDING
– PRIMARY CLARIFIERS
– SECONDARY CLARIFIERS
AERATION TANKS
PRIMARY
SECONDARY
DIGESTERS
PRIMARY
SECONDARY
PUMP AND DETRITOR BUILDING
CHLORINE CONTACT CHAMBER
INFLUENT
BY-PASS
EFFLUENT

Design-Data

GENERAL

Type of Plant - Activated sludge.

Design Population - 65,000

Design Plant Flow - 12 1/2 MGD

Per Capita Flow - 190 gallons

Five Day BOD -

Raw Sewage - 170 PPM

Removal - 90%

Suspended Solids -

Raw Sewage - 175 PPM

Removal - 90%

PRIMARY TREATMENT

Influent Sewer

48" concrete sewer with a 48" by-pass.

Screening

Two coarse bar screens with 5" spaces provided.

Comminution

Two size 43 Infilco Rotogrators each having a capacity of 8 MGD.

Raw Sewage Pumps

Four 12" Fairbanks-Morse pumps, each having a capacity of 3840 GPM at 45' total head and driven by a 75 HP motor. Pumps are float controlled by depth in the wet well.

Grit Removal

Two Dorr Detritors, Type WA, for concrete collecting tank 20' square x 5' total depth with common cleaning mechanism (grit rake) 2'3" wide x 29'5" sloping length and two organic return pumps. Velocity through the detritor is less than one foot per second.

Primary Settling Tanks

Four circular concrete settling tanks each 70' in diameter x 10' SWD complete with Eimco Process Type "C" primary settling tank mechanisms.

Detention time - 2 hours at design flow of 12.5 MGD.

Grit Storage

One 27 cu. ft. hopper as manufactured by Dodge Mfg. Division, United Steel Corp. with a 12" x 12" rack and pinion slide gate.

SECONDARY TREATMENT

Aeration Tanks

Triple pass process involving six tanks each 200' long x 30' wide x 15' deep. Detention time of six hours at design flow 12.5 MGD.

Air Supply to Tanks

Eight 24' headers in each tank. Eighteen Walker Process Diffusair Spargers @ 16 1/2" centres per header. Total number of Spargers per tank equals 144. Total number of Spargers in aeration section equals 864.

Air Blowers

Three Sutorbilt heavy duty blowers, 18 x 18 series 600, supplying 4296 cfm @ 9 psig. Each blower is driven by a 200 HP Tamper Synchronous Motor. Three Tamper M-6 motor generator sets provide D. C. excitation to above synchronous motors.

Secondary Settling Tanks

Four circular concrete settling tanks each 70' in diameter x 10' SWD complete with Eimco Process Type "C" secondary settling tank mechanisms. Detention time - two hours at design flow of 12.5 MGD.

DIGESTERS

Primary

Two concrete tanks 55' diameter x 19'6" SWD - (maximum liquid height 18'6" at side wall, 25'3" at centre.)

Volume of each tank 49,300 cu. ft. or 300,000 gallons. Each tank is equipped with a fixed steel dome roof as manufactured by Dorr-Oliver-Long complete with mixer.

Secondary

Two concrete tanks 7" diameter x 25'6" SWD - (maximum liquid height 22'6" at

Secondary - Continued

side wall, 30' 9" at centre.) Volume of each tank 97,200 cu. ft. or 600,000 gallons. Each tank is equipped with a Dorr-Oliver-Long Secondary Type "B" centre guided gas holder cover having 5' lift and designed for a gas pressure of 6" of water.

Heat Exchangers

Two Dorrco spiral heat exchangers - size #34.

Vacuum Filtration

Two Komline-Sanderson Coil Filters 11'6" diameter x 10' long. Filter area of 350 sq. ft./filter. Production (manufacturer's specifications) 5 lbs. of dry solids/sq. ft./hour. Drum speed - three to twelve min./revolution. Vacuum pump (one for each filter) - Nash Hytor L-7 driven by 50 HP motor at 570 rpm with drawing 1000 cfm at 12" Hg. vacuum.

CHLORINATION

One Fischer and Porter model 70C2410 manual rate adjustment with solution feed operating in conjunction with one Fischer and Porter liquid chlorine evaporator.

Weigh Scale

One Fairbanks-Morse #12140, 60" x 48" platform with two cradles.

Chlorine Storage

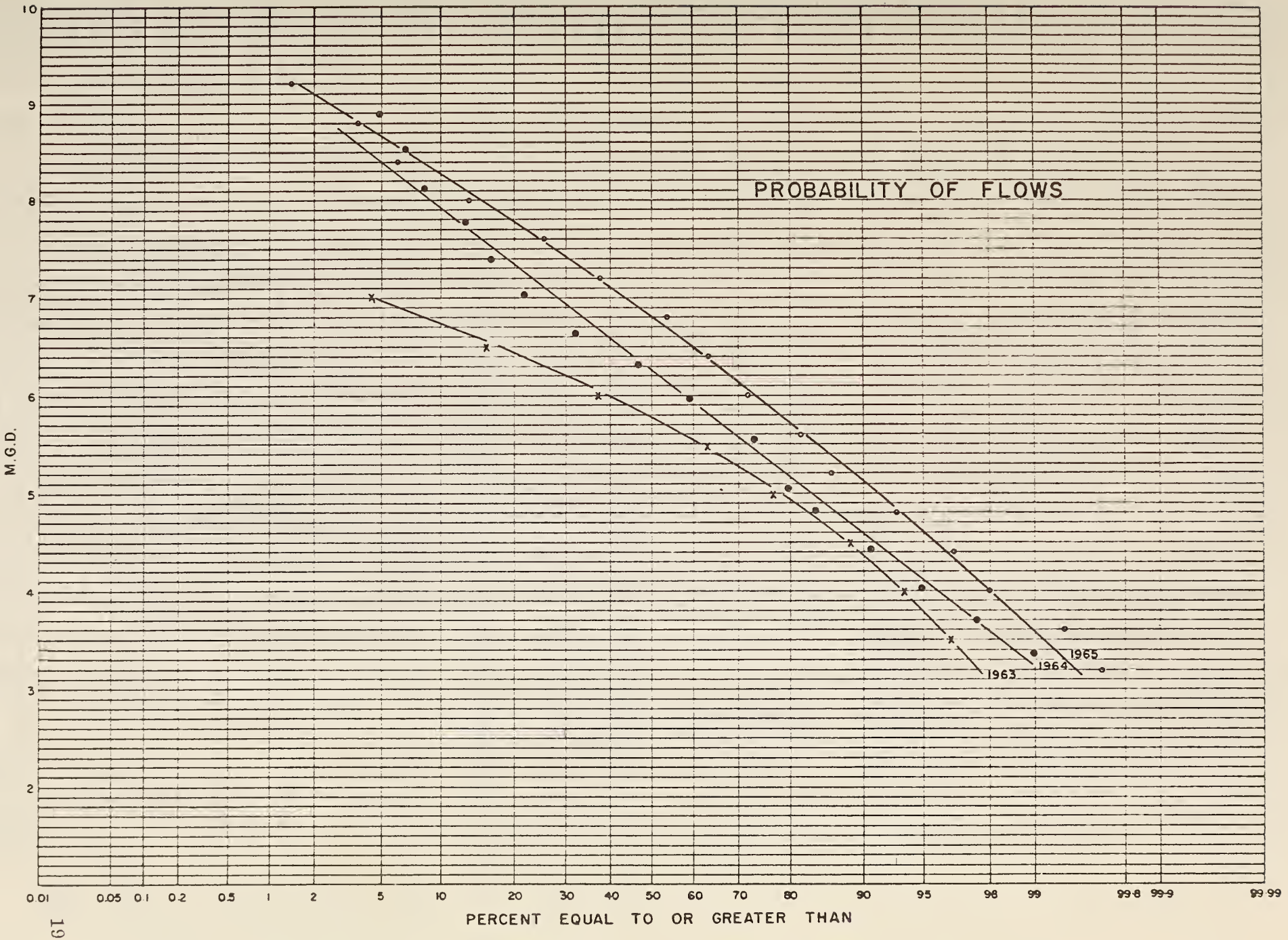
Sufficient area to store up to twenty one-ton cylinders.

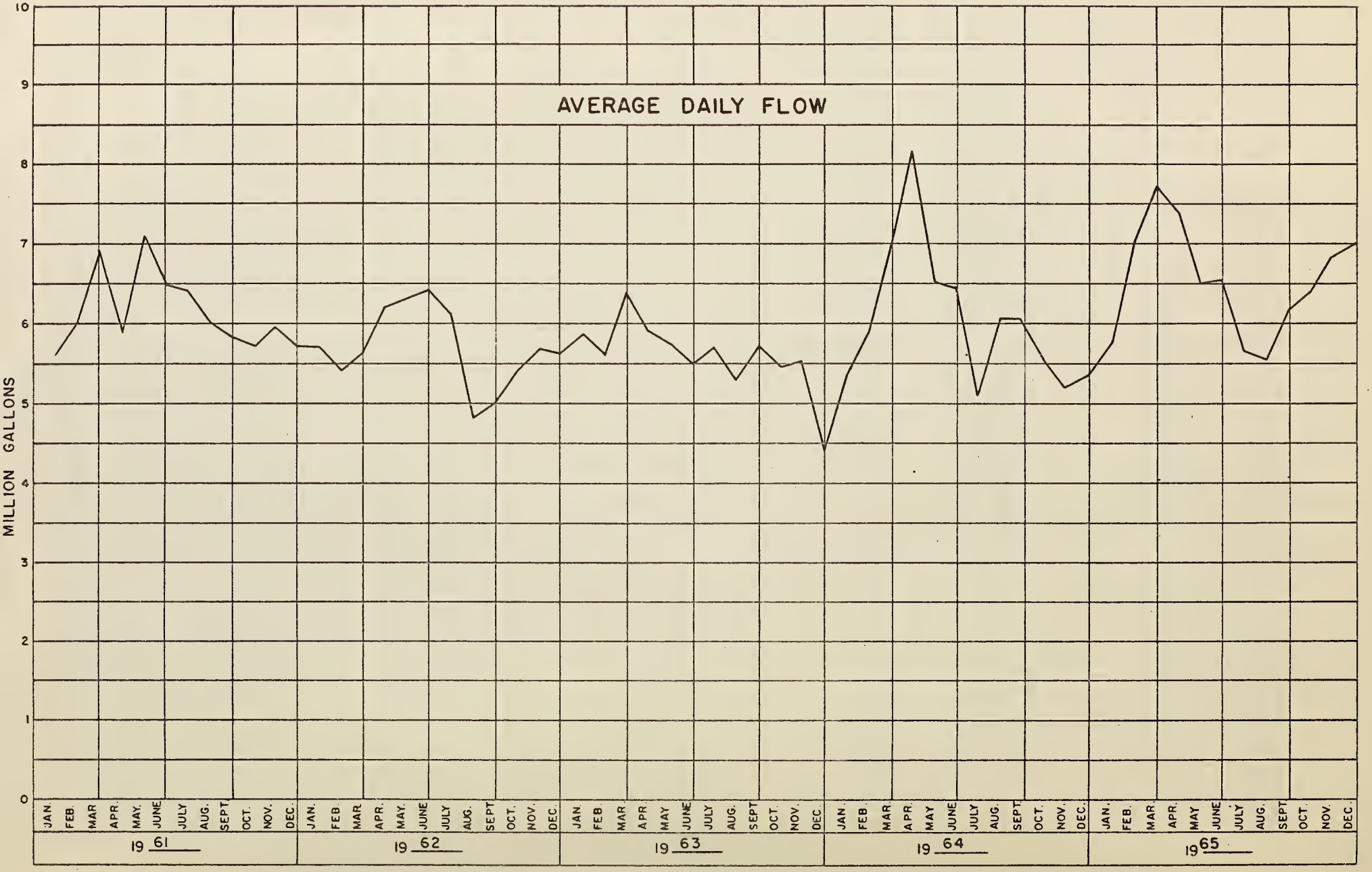
Process Data

FLOW

As will be noted from the accompanying charts and graphs, the average daily flow and total flow for the year were greater than the 1964 flows. During 1965 the average daily flow was 6.57 as compared to 6.07 million gallons per day in 1964. This is an increase of 8.5%. During the past year, 2.4 billion gallons of raw sewage composed of both industrial and domestic waste received complete treatment.

The maximum 24 hour flow in the past year was 11.12 million gallons and occurred in the month of March. The greatest average daily flow for one month was 7.74 million gallons, and occurred in March.


PROBABILITY OF FLOWS
M.G.D.
10
9
8
7
6
5
4
3
2
0.01
0.05
0.1
0.2
0.5
1
2
5
10
20
30
40
50
60
70
80
90
95
98
99
99.8
99.9
99.99
PERCENT EQUAL TO OR GREATER THAN
1965
1964
1963

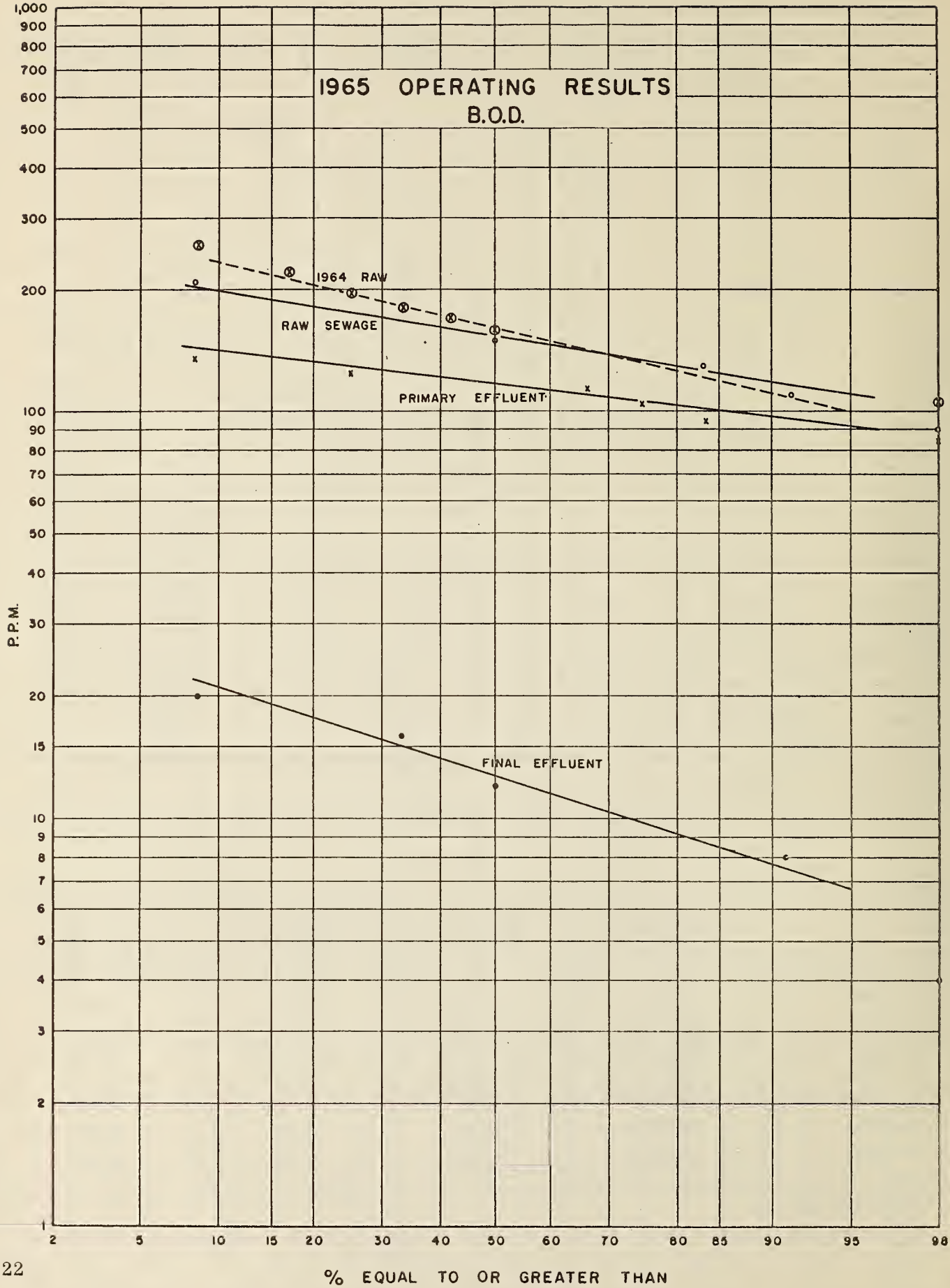

AVERAGE DAILY FLOW
MILLION GALLONS
0
1
2
3
4
5
6
7
8
9
10
JAN. FEB. MAR. APR. MAY. JUNE JULY AUG. SEPT. OCT. NOV. DEC.
19 61
19 62
19 63
19 64
19 65

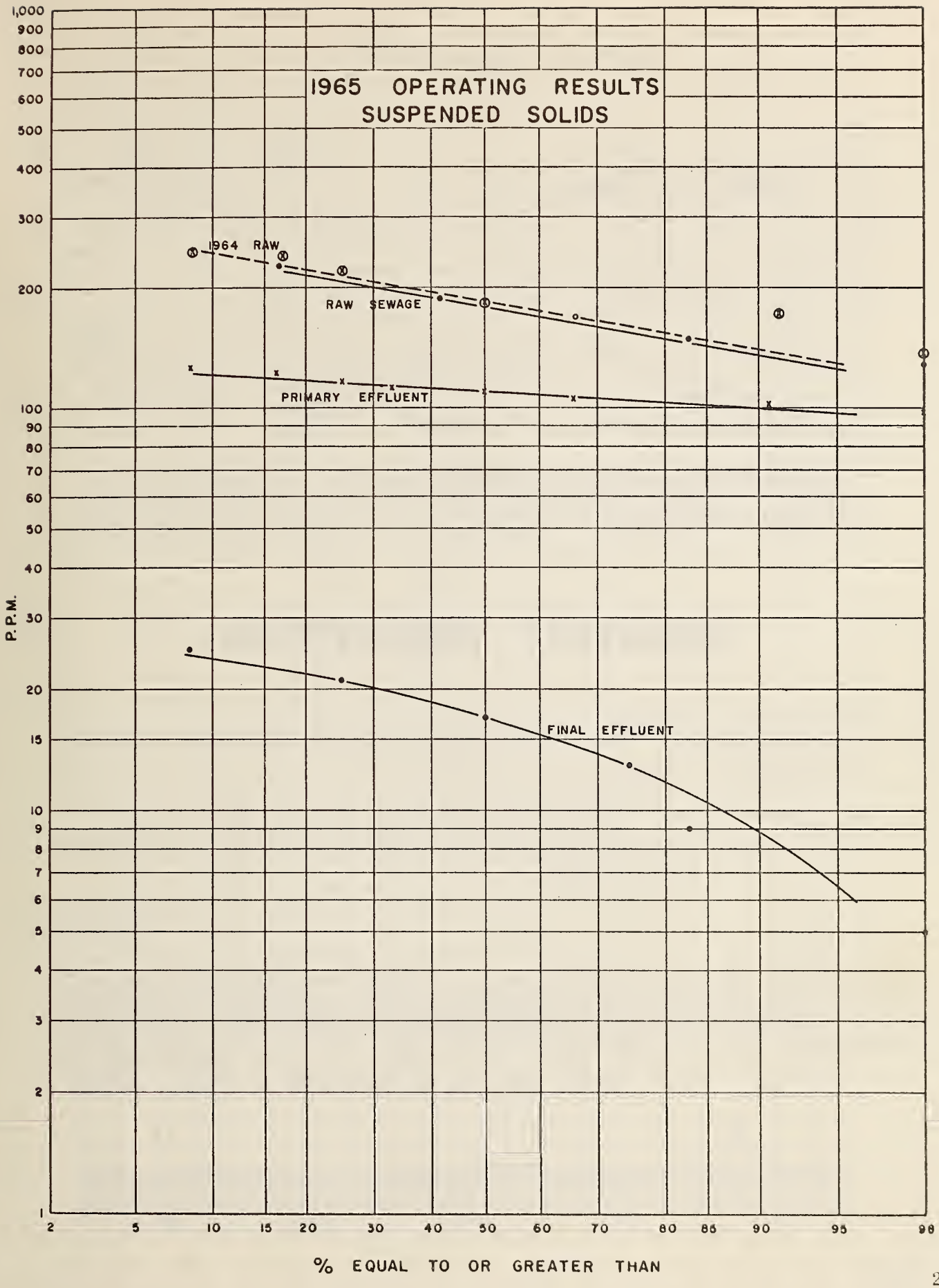
FLOW DATA

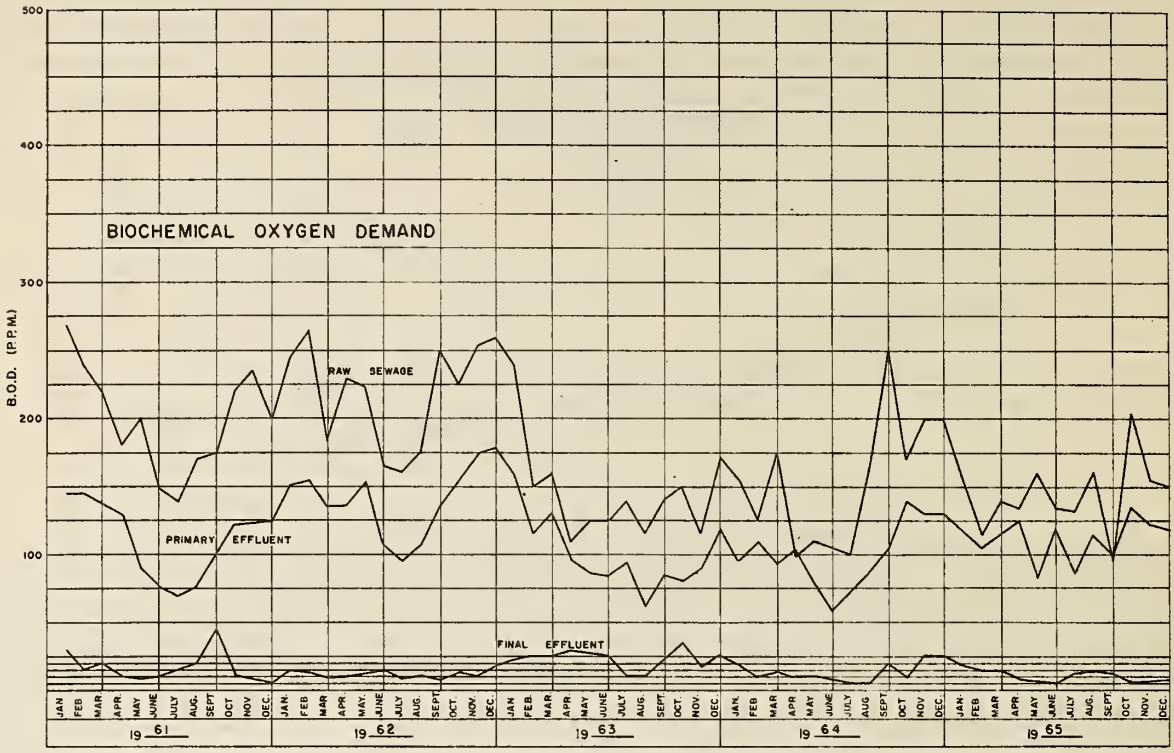
Month	Total Flow MG	Max. Day for month MG	Max. Rate for month MG	Min. Day for month MG	Min. Rate for month MG	Avg. Daily for month MG
January	179.27	7.48	11.9	3.46	2.5	5.78
February	196.85	10.77	16.7	4.41	1.2	7.03
March	239.85	11.12	13.5	5.62	3.1	7.74
April	222.41	9.24	13.6	5.30	2.8	7.41
May	202.44	8.09	11.3	3.79	2.5	6.53
June	196.10	7.39	17.3	4.52	2.4	6.54
July	176.41	7.43	15.2	3.31	1.6	5.69
August	175.27	7.00	16.1	3.61	2.5	5.65
September	185.31	7.61	18.4	2.74	2.6	6.18
October	198.72	8.18	16.5	4.64	3.0	6.41
November	205.57	8.85	14.3	4.85	3.3	6.85
December	217.16	8.11	13.6	5.36	3.3	7.01
Total	2395.36	-	-	-	-	-
Average	199.61	-	-	-	-	6.57

Year	Total Flow MG	Max. Daily MG	Min. Daily MG	Avg. Daily MG
1960 *	1651.0	8.60	3.96	5.39
1961	2287.0	8.05	2.50	6.26
1962	2080.0	7.90	3.26	5.70
1963	2040.0	9.50	2.36	5.59
1964	2221.0	9.78	2.78	6.07
1965	2395.0	11.12	2.74	6.57

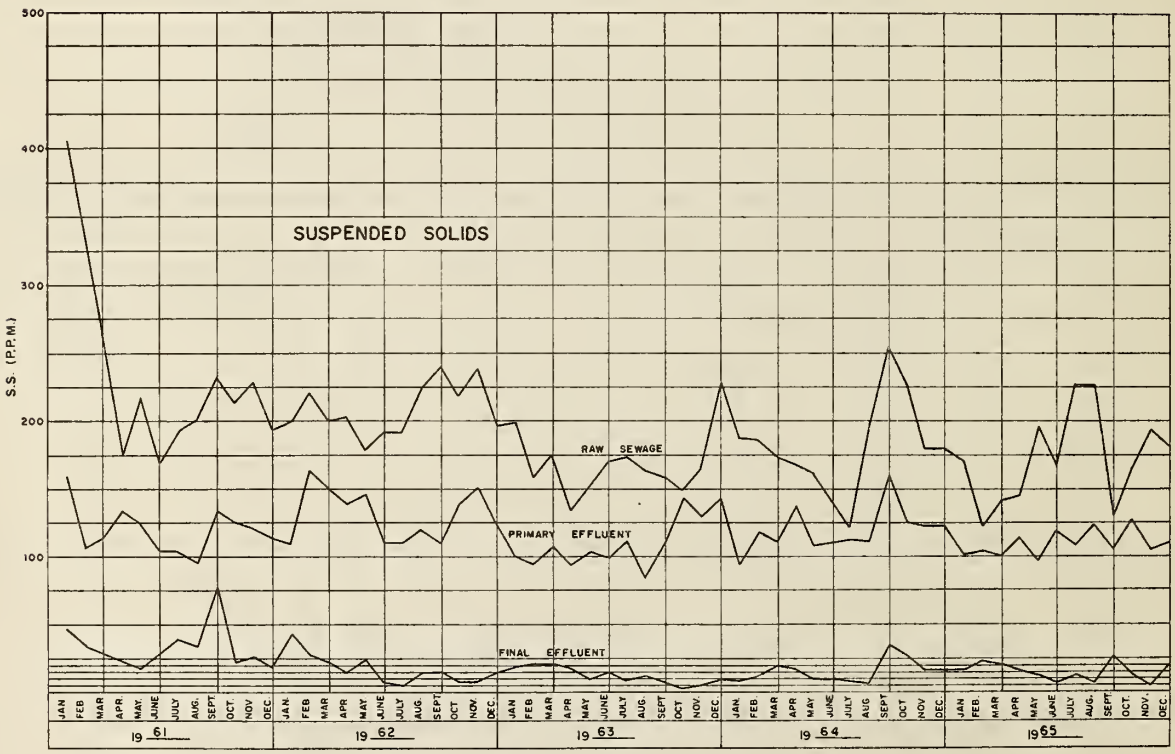
* 10 MONTH'S DATA ONLY


1965 OPERATING RESULTS
B.O.D.
1964 RAW
RAW SEWAGE
PRIMARY EFFLUENT
FINAL EFFLUENT
P.P.M.
% EQUAL TO OR GREATER THAN
1,000
900
800
700
600
500
400
300
200
100
90
80
70
60
50
40
30
20
15
10
9
8
7
6
5
4
3
2
1
2
5
10
15
20
30
40
50
60
70
80
85
90
95
98


1965 OPERATING RESULTS
SUSPENDED SOLIDS
1964 RAW
RAW SEWAGE
PRIMARY EFFLUENT
FINAL EFFLUENT
P.P.M.
% EQUAL TO OR GREATER THAN
1,000
900
800
700
600
500
400
300
200
100
90
80
70
60
50
40
30
20
15
10
9
8
7
6
5
4
3
2
1
2
5
10
15
20
30
40
50
60
70
80
85
90
95
98



MONTHLY VARIATIONS

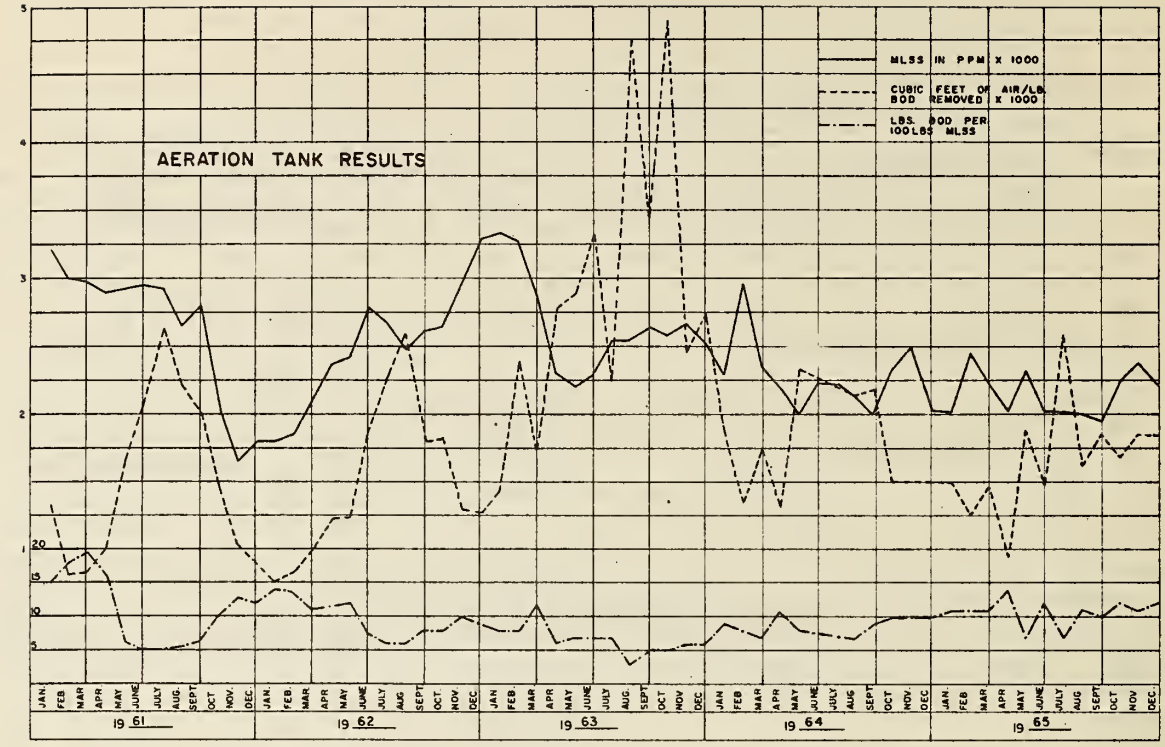


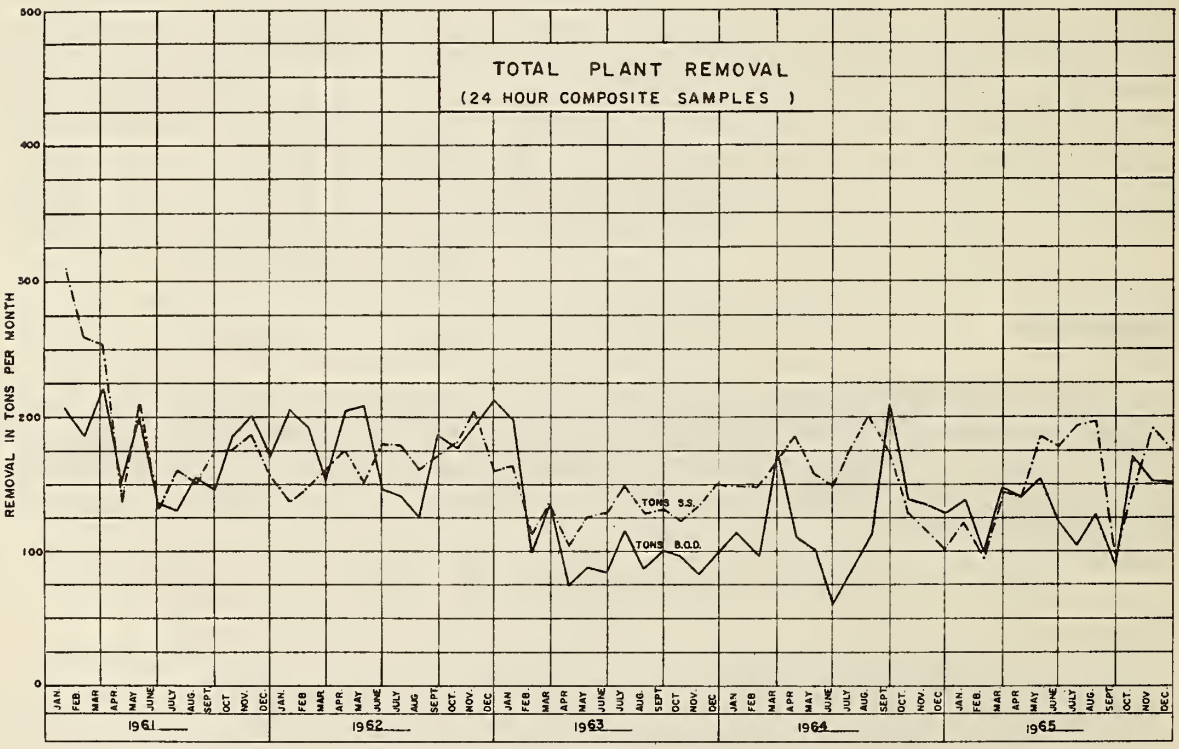
GRIT, B.O.D AND S.S. REMOVAL

MONTH	B. O. D.				S. S.				GRIT REMOVAL CU. FT.
	INFLUENT P.P.M.	EFFLUENT P.P.M.	% REDUCTION	TONS REMOVED	INFLUENT P.P.M.	EFFLUENT P.P.M.	% REDUCTION	TONS REMOVED	
JAN.	155	18	88.5	122.8	171	18	90.0	138.0	510
FEB.	115	16	86.0	97.4	123	23	81.5	98.4	370
MAR.	140	16	88.5	148.7	142	21	85.0	145.1	453
APR.	135	8	93.5	140.8	144	17	88.0	141.2	399
MAY	160	7	96.0	155.3	196	12	94.0	186.2	449
JUNE	130	5.8	95.5	121.8	168	7	96.0	157.9	534
JULY	132	12	91.0	105.8	228	12	94.5	190.5	462
AUG.	160	15	90.5	127.1	228	8	96.5	192.8	696
SEPT.	98	12	87.5	79.7	130	27	79.0	95.4	618
OCT.	205	7.4	96.5	196.3	164	14	91.5	149.0	474
NOV.	156	7	95.5	153.1	194	5	97.5	194.3	593
DEC.	150	9.2	94.0	152.9	181	19	89.5	175.9	502
TOTAL	-	-	-	1604.9	-	-	-	1880.4	6060
AVG.	145	11	92.5	133.7	172	15	91.0	156.7	505

COMMENTS

Raw sewage strengths during 1965 were 145 ppm BOD and 172 ppm SS. The final effluent contained 11 ppm BOD and 15 ppm SS, both of which are within the Commission's objectives of 15 ppm. Satisfactory removal efficiencies of 92.5% for BOD and 91.0% for SS were obtained. An average of 2.5 cu. ft. of grit was removed from each million gallons of sewage received.


AERATION TANK RESULTS
MLSS IN PPM X 1000
CUBIC FEET OF AIR/LB. BOD REMOVED X 1000
LBS. BOD PER 100 LBS MLSS
5
4
3
2
1
20
15
10
5
JAN. FEB MAR APR MAY JUNE JULY AUG. SEPT OCT NOV. DEC.
1961
1962
1963
1964
1965

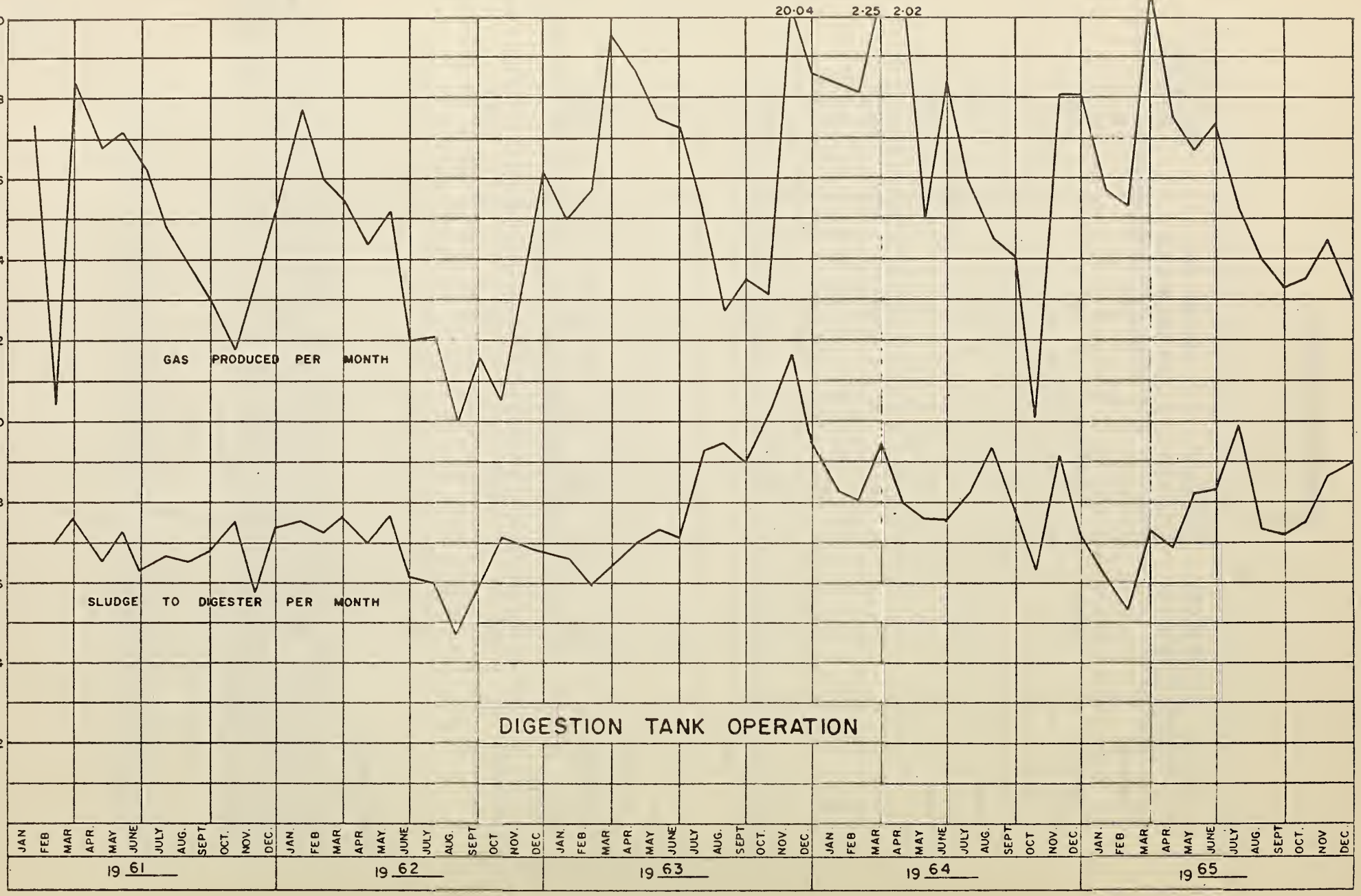

TOTAL PLANT REMOVAL
(24 HOUR COMPOSITE SAMPLES)
REMOVAL IN TONS PER MONTH
500
400
300
200
100
0
TONS S.S.
TONS B.O.D.
JAN. FEB MAR APR MAY JUNE JULY AUG. SEPT OCT NOV. DEC.
1961
1962
1963
1964
1965

AERATION SECTION

MONTH	PRIM. EFFL B.O.D. P.P.M.	M.L.S.S. P.P.M.	LBS. BOD. PER 100 LBS. M. L. S. S.	CUBIC FEET AIR PER LB. B.O.D. REMOVED
JANUARY	118	2027	11	1516
FEBRUARY	106	2458	11	1254
MARCH	116	2232	11	1481
APRIL	125	2029	14	935
MAY	84	2259	7	1898
JUNE	120	2004	12	1470
JULY	86	2023	7	2590
AUGUST	114	2002	11	1618
SEPTEMBER	100	1974	10	1827
OCTOBER	136	2223	13	1192
NOVEMBER	122	2397	11	1825
DECEMBER	120	2238	11	1364
TOTAL	-	-	-	-
AVERAGE	112	2156	11	1581

COMMENTS

During 1965 continued difficulty was experienced in maintaining the proper balance in the aeration tanks. The mixed liquor suspended solids averaged 2156 ppm and subsequently the "cu. ft. air/lb. BOD removed" was 1581. This ratio is still higher than normal; however it is expected that as the plant loadings increase the aeration tank balance will improve.


20·04
2·25
2·02
GAS PRODUCED PER MONTH
SLUDGE TO DIGESTER PER MONTH
DIGESTION TANK OPERATION
CUBIC FEET GAS PRODUCED X 100,000
GALLONS SLUDGE TO DIGESTER X 100,000
20
18
16
14
12
10
8
6
4
2
JAN FEB MAR APR MAY JUNE JULY AUG. SEPT OCT. NOV. DEC.
19 61
19 62
19 63
19 64
19 65

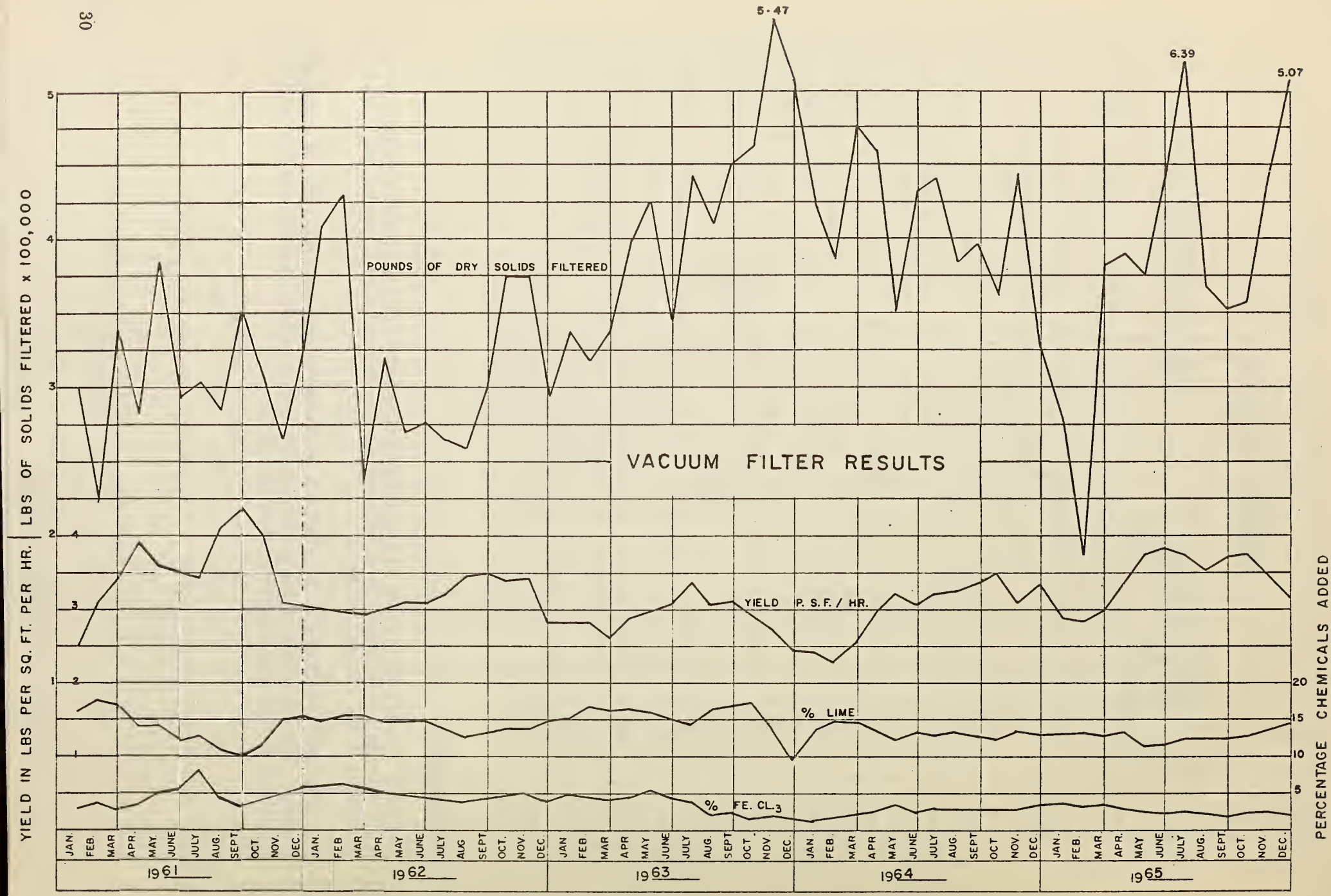
DIGESTER OPERATION

MONTH	SLUDGE TO DIGESTERS			SLUDGE FROM DIGESTERS			GAS PRODUCED 1000'S Cu. Ft.
	1000'S CU FT.	% SOLIDS	% VOL. MAT.	1000'S CU. FT.	% SOLIDS	% VOL. MAT	
JAN.	97.33	6.06	4.39	82.88	5.41	3.42	1565.60
FEB.	84.53	6.70	4.60	52.78	5.62	3.56	1535.80
MAR.	118.16	6.05	4.25	102.53	5.98	3.67	2067.30
APR.	110.57	6.39	4.29	107.37	5.81	3.52	1750.40
MAY	116.58	6.16	4.22	97.79	6.16	3.68	1680.90
JUNE	118.38	5.53	3.73	112.91	6.26	3.71	1745.30
JULY	158.05	5.59	3.64	163.59	6.21	3.62	1541.00
AUG.	118.15	6.73	4.15	96.80	6.14	3.46	1430.70
SEPT.	115.70	5.91	4.01	87.70	6.50	3.68	1379.20
OCT.	121.66	5.44	3.85	83.82	6.80	3.80	1546.30
NOV.	138.33	5.33	3.71	118.02	6.42	3.75	1457.70
DEC.	147.42	5.46	3.82	135.17	6.14	3.60	1313.50
TOTAL	1444.86	-	-	1221.36	-	-	19013.70
AVG.	120.40	5.95	4.06	103.45	6.12	3.62	1584.48

COMMENTS

A total of 1,444,860 cu. ft. of raw sludge was pumped to the digester in the past year. An average concentration of 5.95% solids was obtained which represents a total of 5,364,476 lbs. of total solids.

A total of 19,013,700 cu. ft. of gas was produced to supplement the fuel supply at the plant. The cubic feet of gas produced per pound of volatile matter was 5.2 which is close to the average accepted values of 6 to 10.


5.47
6.39
5.07
POUNDS OF DRY SOLIDS FILTERED
VACUUM FILTER RESULTS
YIELD P. S. F. / HR.
% LIME
% FE. CL.3
YIELD IN LBS PER SQ. FT. PER HR. | LBS OF SOLIDS FILTERED x 100,000
PERCENTAGE CHEMICALS ADDED
JAN. FEB. MAR APR. MAY JUNE JULY AUG. SEPT OCT. NOV. DEC.
1961
1962
1963
1964
1965

VACUUM FILTER OPERATION

MONTH	FILTER HOURS		% SOLIDS DIGEST SLUDGE	LBS. DRY SOLIDS FILTERED	LBS. LIME	% LIME	LBS. $FeCl_3$	% $FeCl_3$	% SOLIDS FILTERED SLUDGE	YIELD PSF/HOUR
	#1	#2								
JAN.	136.50	136.25	5.39	278038	36925	13.2	10755	3.87	16.3	2.89
FEB.	94.75	94.17	5.68	186790	24745	13.2	6084	3.26	17.1	2.83
MAR.	188.00	179.16	6.00	382912	49490	12.9	12798	3.34	17.7	2.99
APR.	166.67	166.25	5.85	390979	51940	13.2	12465	3.19	18.6	3.36
MAY.	145.16	141.43	6.18	275003	43645	11.6	10452	2.79	19.4	3.74
JUNE	194.17	134.25	6.27	440480	51660	11.7	11529	2.62	18.1	3.84
JULY	256.00	232.75	6.26	638550	78645	12.3	15327	2.40	18.5	3.72
AUG.	146.41	152.08	6.11	369544	45955	12.4	8793	2.38	18.5	3.54
SEPT.	120.25	150.50	6.44	352157	43785	12.4	7272	2.06	18.2	3.72
OCT.	119.41	152.08	6.84	356046	45975	12.9	8557	2.40	17.8	3.76
NOV.	185.58	195.50	6.26	462184	62440	13.5	11610	2.51	17.6	3.44
DEC.	232.08	231.25	6.04	507105	72765	14.3	10656	2.10	17.5	3.16
TOTAL	2064.98	1965.67	-	4739788	607970	-	126298	-	-	-
AVG.	172.08	163.81	6.11	394982	50664	12.8	10252	2.66	17.9	3.42

COMMENTS

During 1965, 2370 tons of dry solids were filtered. The solids from the digester were increased from an average of 6.11% solids to 17.9% solids. At 17.9% solids the 2370 tons of dry solids took the form of 13,200 tons of sludge to be hauled away for disposal.

The amounts of solids filtered decreased slightly during the year as opposed to the 1964 production of 2461 tons.

Chemical consumption, lime and ferric chloride, decreased slightly during 1965.

CHLORINATION

MONTH	PLANT FLOW (MG)	POUNDS CHLORINE	DOSAGE RATE (P.P.M)
JANUARY	179.27	-	-
FEBRUARY	196.85	-	-
MARCH	239.85	-	-
APRIL	222.41	-	-
MAY	202.44	* 884	1.23
JUNE	196.10	5936	3.03
JULY	176.41	6570	3.72
AUGUST	175.27	5568	3.18
SEPTEMBER	185.31	5084	2.74
OCTOBER	198.72	4810	2.42
NOVEMBER	205.57	4244	2.06
DECEMBER	217.16	4568	2.10
TOTAL	2395.36	37664	-
AVERAGE	199.61	4708	2.64

* Eleven days chlorination

COMMENTS

Chlorine at this plant is used for disinfection of the final effluent 12 months a year. This extended chlorination program was commenced in May 1965. Approximately 2.6 ppm of chlorine was necessary to give a 15 minute residual of 0.5 ppm.

CONCLUSIONS

Generally, the plant operated satisfactorily in 1965, and produced an effluent meeting the OWRC objectives most of the time. Continual process experimentation was carried out during the year, and resulted in an improved efficiency.

A staff reorganization initiated in 1965 and completed early in 1966 is expected to result in improved manpower usage, morale, efficiency, economy and maintenance practices.

Ontario Water Resources Commission
Division of Plant Operations.

Brantford - Water pollution
contol plant.
TD227/B73/W37/1965/MOE
Annual Report 1965

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